

#4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **MATSUI, Hisaji et al.**

Group Art Unit: 1754

Serial No.: 09/868,620

Examiner: **Unassigned**

Filed: **June 25, 2001**

P.T.O. Confirmation No.: 1040



**INVENTOR: AMORPHOUS NANO-SCALE CARBON TUBE AND PRODUCTION METHOD THEREFOR**

**INFORMATION DISCLOSURE STATEMENT**  
**PURSUANT TO 37 CFR 1.97(b)**

Commissioner for Patents  
Washington, D.C. 20231

**RECEIVED**  
AUG 02 2002  
**TC 1700**  
July 31, 2002

Sir:

The attention of the Patent and Trademark Office is hereby directed to the documents listed on the attached Form PTO-1449. One copy of each of these documents is attached along with a List of Publications.

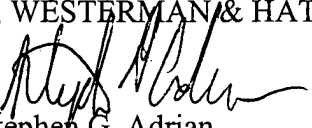
No fee or certification is required in connection with this Information Disclosure Statement, since it is being submitted prior to the issuance of a first official action on the merits or expiration of the three month period following the filing date or the entry of the national stage of the above-captioned application.

The above information is presented so that the Patent and Trademark Office can, in the first instance, determine any materiality thereof to the claimed invention. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the documents cited in the attached Form PTO-1449 be made of record therein and appear on the first page of any patent to issue therefrom.

The Commissioner is authorized to charge our Deposit Account No. 01-2340 for any fee which is deemed by the Patent and Trademark Office to be required to effect consideration of this statement.

Respectfully submitted,

ARMSTRONG, WESTERMAN & HATTORI, LLP

  
Stephen G. Adrian  
Attorney for Applicant  
Reg. No. 32,878

SGA/alw

Atty. Docket No. **010756**  
Suite 1000, 1725 K Street, N.W.  
Washington, D.C. 20006  
(202) 659-2930



**23850**

PATENT TRADEMARK OFFICE

Enclosures: PTO-1449, List of Publications  
and references (12)

Q:\FLOATERS\SGA\01\010756 IDS

List of publications

	English language documents		First cited in foreign appln Yes/No  Check after 3 months from filing
	U.S. patent :patentee/number/issue date	Foreign patent :country/number/publication date Publication : author/place/title/page/publication date	
(a)	Kyotani et al., Chem. Mater., 1996, Vol.8, no.8, pp.2109-2113 published in 1996		Yes
(b)	Wenlou WANG et al., Electrochemical Society Proceedings, 1977, vol.97., no.14, pp.814-824 published in 1997		No
(c)	N.I. Maksimova et al., Carbon, 1999, vol.37, no.10, pp.1657-1661 received by JICST on September 30, 1999		Yes
(d)	Kawase et al., Carbon, 1999, vol. 37, no.3, pp.522-524 published in February 1999		Yes
(e)	E.F. Kukovitskii et al., Chemical Physics Letters, 1997, vol. 266, pp. 323-328 published in 1997		No
(f)	A.C. Dillon et al., Nature 1997, vol. 386, pp.377-379 published in March, 1997		No

	Non-English language documents	English version search report Yes/No	Concise statement Yes/No	English translation Yes/No Partial	English abstract Yes/No	First cited in foreign appln Yes/No  Check after 3 months from filing
	Foreign patent :country/number/publication date Publication : author/place/title/page/publication date					
(1)	WO99/43613 published on September 2, 1999	No	Yes	No	Yes	Yes
(2)	Japanese Patent Publication No. 62-500943 published on April 16, 1987 which is a domestic publication of the Japanese translation of WO86/03455	No	No	Yes WO86/03455	No	No
(3)	Japanese Unexamined Patent Publication 10-72201 published on March 17, 1998	No	Yes	No	Yes	No
(4)	Toshikatsu ISHIKAWA et al, "Shin Tanso Kogyo" published by Kindai Henshuusha on July 1, 1986, Revised edition, pages 64-65	No	Yes	No	No	Yes

(5)	Morinobu ENDO et al, "Formation of carbon nanotubes and nanofibers by gas phase pyrolysis and their industrial applications", Proceedings of workshop on "Carbon-based high performance material nano-technology", Part 1, Carbon nanotube etc. nanotechnology 6 held by New Energy and Industrial Technology Development Organization on April 25, 2001.	No	Yes	No	No	Yes
(6)	WO99/56870 published on November 11, 1999	No	Yes	No	Yes	No

◆ Please note that publications (a) to (f) and (1) to (6) were cited in the office action mailed on May 15, 2002 during the prosecution of the corresponding Japanese national phase application.

◆ Please note that publications (b), (e), (f) and publications (2),(3) and (6) were already cited in the International Search Report issued during the international phase of the instant application and already submitted in the IDS dated August 2, 2001.

◆ If we should submit a full English translation of the Office action issued by the JPO, please let us know urgently.

☐ Please note that publications \_\_\_\_\_ are those which the applicants are aware of.

☐ Please note that publications \_\_\_\_\_ are cited in the European Search Report issued in the corresponding EP application.

**Concise statement of relevancy  
of the Japanese-language documents**

**Publication (1) : WO99/43613**

The Japanese Examiner pointed out as follows:

The Japanese national stage application (corresponding to the above-identified USSN 09/868,620) is not entitled to the benefit of Japanese domestic priority, since the Japanese domestic priority applications do not disclose that the carbon nanotubes of claim 1 have a d002 value of 3.54 Å or more and a  $2\theta$  value of 25.1° or less. Therefore, publication (1) is a prior art reference.

Publication (1) discloses a process for preparing carbon nanotubes comprising subjecting a carbon material containing reactive  $-C\equiv C-$  and/or  $=C=$  to an irradiation treatment by light, electron beam and/or ion beam, or to a combination of said irradiation treatment and a heat treatment. Example thereof discloses preparing carbon nanotubes by subjecting a carbon material containing reactive  $-C\equiv C-$  and/or  $=C=$  to an irradiation treatment by electron beam with heating at 800 °C under reduced pressure.

On the other hand, **Publication (6) (WO99/56870)** discloses that amorphous carbon nanotubes having an amorphous structure are obtained by subjecting a carbon material containing reactive  $-C\equiv C-$  and/or  $=C=$  to an irradiation treatment by light, electron beam and/or ion beam, or to a combination of said irradiation treatment and heat treatment. Example 1 thereof discloses preparing amorphous carbon nanotubes having no graphite structure and having a d002 value of 4.5 Å, by subjecting a carbon material containing reactive  $-C\equiv C-$  and/or  $=C=$  to an irradiation treatment by electron beam with heating at 800 °C under reduced pressure.

Publication (1) does not disclose that the carbon nanotubes obtained have amorphous structure. However, publication (1) discloses substantially the same process as the process disclosed in publication (6), so that the carbon nanotubes disclosed in publication (1) would also possess a d002 value of about 4.5 Å.

Therefore, the carbon nanotubes disclosed in publication (1) would possess an amorphous structure as possessed by the claimed tubes. Accordingly, the claimed invention as defined in claims 1-7 and 27 lack novelty or inventive step.

**Publication (3) : Japanese Unexamined Patent Publication 10-72201**

Relying on publication (3) (and publication (f)), the Japanese Examiner states that it is well known to use carbon nanotubes as a material for storing gas such as hydrogen.

We herewith enclose an English abstract of Publication (3).

**Publication (4) : Ishikawa et al**

The Japanese Examiner pointed out relying on this publication (4) that the Franklin's equation (disclosed on page 65, left column, line 4) is considered to show that a d002 value of less than 3.44 Å indicates the presence of graphite structure.

**Publication (5): Endo et al**

Relying on publication (5), the Japanese Examiner asserted as follows.

In carbon nanotubes, a d002 value not only reflects graphite structure. It is known from Publication (5) that the d002 value becomes larger when the tube diameter becomes smaller, and the Franklin's equation is not applicable as in conventional graphite materials, as seen from Fig. 1 (b) of publication (5).

Therefore, it cannot be concluded that the carbon tubes of the present invention do not have any graphite structure even if the d002 value of the carbon tubes of the present invention is 3.54 Å or more.

**Remarks**

- (I) Please note that although the Japanese Examiner cited publications (5) and (6) in her office action, publications (5) and (6) were published after the International Filing Date (October 29, 1999) of the subject application.
- (II) We would not submit a concise statement of relevancy with respect to Publication (2) since WO86/03455 is a full English translation thereof.  
We assume that a copy of WO86/03455 was already submitted together with an IDS filed on August 2, 2001.